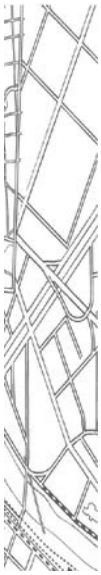

Traffic Report

Proposed Residential Development - Lot 104, Precinct C, Rhodes Peninsula

March 2007

Prepared for

Meriton Apartments Pty Ltd.

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Authorised by:

Bruce Masson

Contents

1. Introduction

This report has been prepared on behalf of Meriton Apartments Pty Ltd. It presents the findings of an investigation into the traffic and parking implications of a new residential apartment development in Precinct C, Rhodes Peninsula.

The proposed development site is the vacant Lot 104 in the western section of Precinct C on Rhodes Peninsula as shown in **Figure 1**. Development within this area is governed by the Rhodes Peninsula Development Control Plan (RPDCP) developed by the Department of Infrastructure, Planning and Natural Resources (DIPNR).

A Masterplan for the development of Lots 100, 101, 102, 103 and 104 was prepared by Meriton Apartments in May 2005. Based on the information provided in the Masterplan, Masson Wilson Twiney undertook a traffic report assessing the cumulative traffic implications of the development of these lots. Because the intersection analysis has been conducted to assess the cumulative impact of the development of Lot 104, in conjunction with Lots 100, 101, 102 and 103, it is not deemed necessary to reiterate this information in each development application. An overview report containing this information is provided in **Appendix A** and should be read in conjunction with this report.

The basis of this report is to undertake a comparison of the traffic generation for the proposed scheme with the assumed traffic generation in the Masterplan Overview Traffic Report and to provide recommendations for compliance of the development with the RPDCP and relevant Australian Standards.

The remainder of this report is structured as follows:-

1. Chapter 2 describes the proposed development and undertakes a comparison of the traffic generation and vehicle access arrangements for the Lot 104 development with the previously assumed traffic generation and access assumptions;
2. Chapter 3 presents the parking provisions, access and layout requirements for the development, and
3. Chapter 4 provides a summary and conclusions.

2. Proposed Development

2.1 Overview of the Development Proposal

The site provides an area of 4,7840m2. It is proposed to provide a total of 75 residential dwellings on this lot, comprised of the following:

- 4 x one bedroom units;
- 42 x two bedroom units; and
- 29 x three bedroom units.

Underground car parking for 78 vehicles is provided on two levels, including two service vehicle spaces and one visitor space.

Vehicular access to the underground car parking area will be provided from Darling Avenue.

2.2 Trip Generation

The MWT Overview Traffic Report July 2005 summarised the likely trip generation of the combined development of Lots 100, 101, 102, 103 and 104. The Overview Report assumed that Lot 104 would be developed to provide 90 apartments. This proposal therefore represents 15 less units or a 17% decrease in the number of units. A peak hour trip rate of 0.29 vehicle trips/unit was applied in the Overview Report, which is the same rate assumed in the Rhodes Peninsula TMP. Applying this rate to the proposed development of Lot 104, results in a trip generation of 22 vehicle trips during the peak hours. This represents 4 less residential trips during the peak hour than that estimated in the Overview Report.

2.3 Traffic Impacts

The Overview Report assumed 700 units for the combined development of Lots 100, 101, 102, 103 and 104, which is estimated to generate 203 trips in the peak hours. Looking at the overall scheme of the proposed Precinct C developments compared with the Masterplan scheme assumed in the Overview Report, as shown in **Table 2.1,** the addition and reduction of units roughly balance out overall, resulting in only 2 more residential units and a child care centre. The consequence of this is the proposed Precinct C developments combined generate 9 more vehicle trips during the peak hours than the Masterplan scheme assumed in the Overview Report.

Because the number of trips is only slightly less, the analysis results in the Overview Report remain relatively unchanged and therefore re-analysis has not been undertaken.

The reduction of 4 trips estimated to be generated by the development of Lot 104 will not significantly alter the traffic impact analysis results given in the Overview Report, as the number of trips is negligible.

Table 2-1 - Overview Report Assumptions and DA proposal

	Masterplan Overview Report		**DA Proposal**		**Difference**	**Difference**
Lot	**Units**	**Trip Gen**	**Units**	**Trip Gen**	**Units**	**Trip Gen**
100*	170	49	179	52	+9	+3
101	200	58	217	63	+ 17	+5
			+40 Childcare	8	+ 40 Childcare	+8
102	170	49	184	53	+ 14	+ 4
103	70	20	47	14	- 23	-6
104	**90**	**26**	**75**	**22**	**- 15**	**- 4**
Total	**700**	**203**	**702 + Childcare Centre**	**212**	**+ 2 Units + 40 Childcare**	**9**

The Overview Report assumed access to the site would also be from Darling Avenue, therefore the traffic distribution will not change and the number of trips coming to or from Lot 104 will decrease.

3. Parking, Access and Layout

3.1 Onsite Parking Requirements

The Rhodes Peninsula DCP specifies maximum on site car parking requirements, in addition to requirements for disabled parking, motorcycle parking, bicycle parking and service vehicle parking for various different land uses. These are summarised in **Table 3-1**, along with the number of parking spaces required for the proposed development to comply with the DCP requirements.

Table 3-1 – Rhodes Peninsula DCP Parking Requirements

Use	RPDCP Requirements	Maximum Parking Spaces Required
1 bedroom units	Max 1/dwelling	4
2 bedroom units	Max 1.2/dwelling	50
3 bedroom units	Max 1.5/dwelling	44
Visitor parking	Max 1/10 units	8
Disabled parking	Min 1% of total parking provision	1
Motorcycle Parking	1 car space / 100 car spaces	1
Bicycle Parking (residents)	Min 1/3 units	25
Bicycle Parking (visitors)	Min 1/12 units	6
Service Vehicle Parking	1/50 units for first 200 units + 1/100 units thereafter	2

The maximum allowed car parking for residents is 106 spaces, including 8 visitor spaces. It is proposed to provide 75 residential spaces and 1 visitor space and therefore the design is compliant. Five of the spaces are suitable for disabled parking which is greater than the minimum indicated in the table above. 2 service vehicle spaces are also proposed and comply with the requirements in Table 3.1. Motorcycle and bicycle parking is provided in accordance with DCP parking requirements.

3.2 Vehicle Access and Parking Layout

3.2.1 Vehicle Access

The car park entry incorporates the following design features:

- The driveway is splayed to enable a 9.7m long garbage truck to enter the car park without encroaching on the footpath;

- The first 6m of the entry ramp from the property line is designed with a grade of 1:20;
- The ramp grading is designed in accordance with AS 2890.2:2002 to accommodate a 9.7m garbage truck;
- The ramp is designed for two-way vehicular movements with a minimum width of 6.5 metres kerb-to-kerb and with a minimum height clearance of 4.5 metres to comply with AS2890.2:2002.

Security access into the car park will be decided at the detailed design stage to comply with AS 2890.1:2004.

3.2.2 Internal Car Park Circulation

The aisle widths (minimum 5.8m for two-way flow) and headroom (minimum 2.2m) are designed in accordance with AS 2890.1:2004 requirements for two-way traffic, including headroom requirements for access to loading and disabled parking spaces (except for space 13 where the headroom is 2.3m).

Internal circulation ramps are designed in accordance with AS 2890.1:2004 and allow a B85 and B99 to pass each other.

Care will need to be taken during the detailed design stage to ensure that the minimum headroom clearances are maintained clear of obstructions such as pipes, overhead beams and signage.

3.2.3 Parking Space Dimensions

On site car parking is designed to comply with the dimensional requirements of AS 2890.1:2004.

Each standard car parking space is designed with minimum dimensions of 2.5m x 5.4m and 2.2m headroom.

Disabled spaces meet the minimum dimension requirements of 3.2m x 5.4m and the headroom of 2.5m, as specified in the AS 2890.1:1993, with the exception of the disabled space 13 on the Lower Ground level where the headroom is only 2.3m and would be marked accordingly.

3.2.4 Loading Dock

It is proposed that garbage collection will take place in the underground car park on basement level 1 and the loading dock is designed to accommodate an MRV or 9.5m long garbage truck.

4. Summary and Conclusions

This report has been prepared to assess the DA for a proposed residential development on Lot 104 in Precinct C of Rhodes Peninsula. The development consists of 75 apartments with car parking for 78 vehicles.

The following are the conclusions and recommendations of this report.

- Based on the traffic generation rates assumed in the Overview Traffic Report, this development is expected to generate 22 weekday peak hour trips.
- The Overview Report assumed the development of 90 apartments on Lot 104, which would generate 26 trips. The proposed development now includes for only 75 apartments. The reduction in the number of trips estimated to be generated by the reduction in 15 apartments represents a small reduction in trips on the network. Therefore the previously assessed satisfactory operation of the local road system is still applicable.
- On-site car, bicycle and motorcycle parking is in accordance with the RPDCP.
- Site vehicular access arrangements to and from the site complies with AS2890.1:2004, as required by the RPDCP.
- Parking layouts are in accordance with AS2890.1:2004, as required by the RPDCP.
- Parking space dimensions and internal vehicle circulation complies with requirements specified by AS2890.1:2004 to allow safe, convenient access and circulation.

SITE LOCATION

LOT 104, PRECINCT C, RHODES PENINSULA

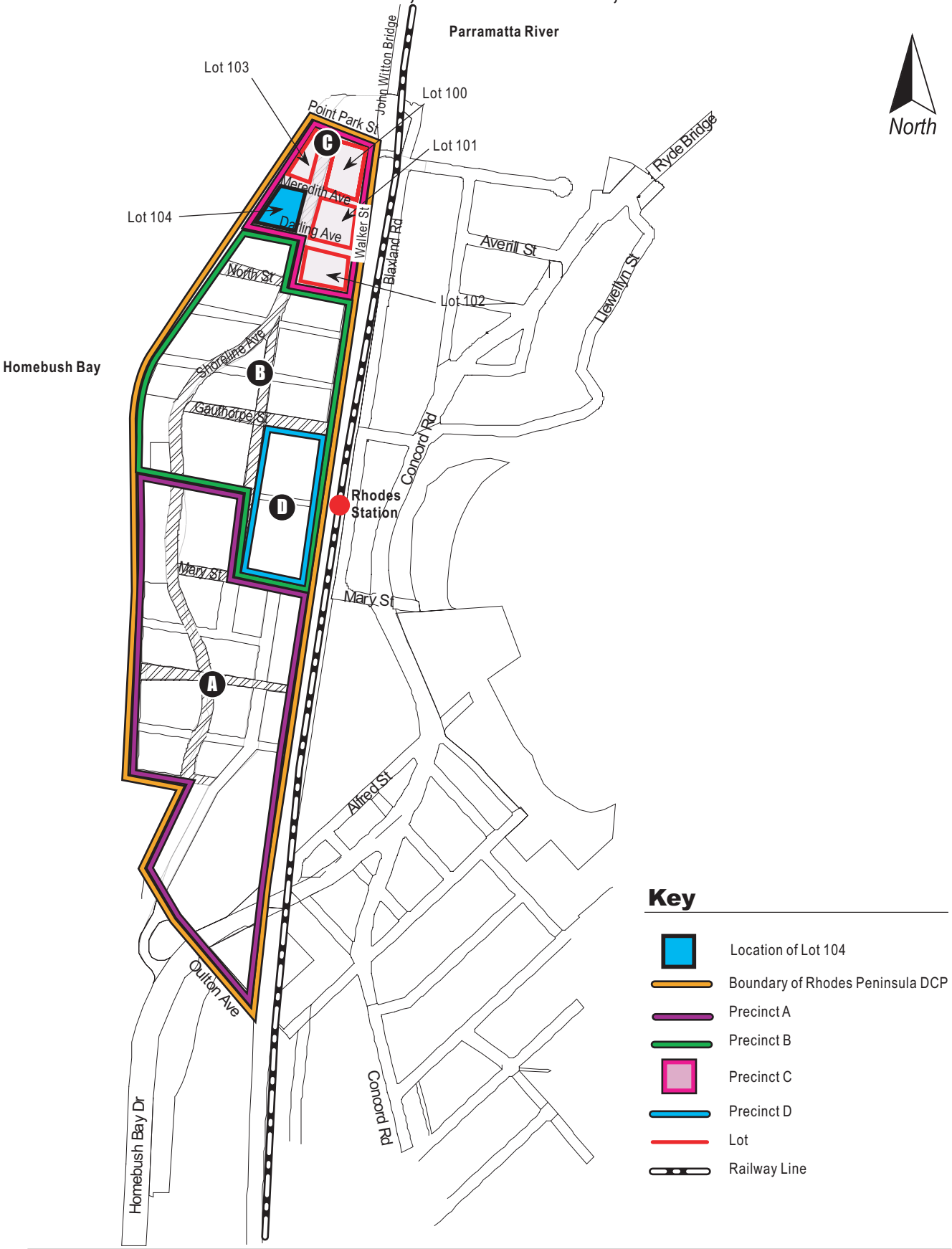

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Figure 1

Filename: 052825di19.ai

Date: 24 November 2006

Appendix A - Overview Traffic Report

OVERVIEW TRAFFIC REPORT

Proposed Residential Developments Precinct C, Rhodes Peninsula

July 2005

Prepared for
Meriton Apartments Pty Ltd

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Contents

1. Introduction

1.1 Introduction

Masson Wilson Twiney have been commissioned by Meriton Apartments Pty Ltd to assess the traffic impacts of a proposed Masterplan for a series of residential developments in Precinct C of Rhodes Peninsula.

Precinct C is located at the northern end of the Rhodes Peninsula. It is bounded by the Parramatta River to the north, North Street to the south, Walker Street and the railway line to the east and Homebush Bay to the west. Development of Lot 100, Lot 101, Lot 102, Lot 103 and Lot 104 is proposed in the Precinct C Master Plan. The location of Precinct C and the individual lots are shown in **Figure 1**.

This report will provide an overview of the traffic implications of the cumulative impact of the development of these lots; therefore detailed intersection analysis will not be undertaken for each individual lot within each development application.

1.2 Planning Context

Development within this area falls under the remit of the Rhodes Peninsula Development Control Plan 2000 (DCP), which was developed by the Department of Infrastructure, Planning and Natural Resources.

In July 2000 Masson Wilson Twiney (MWT) produced a report entitled 'Redevelopment of Rhodes Peninsula'. This report assessed the wider traffic impacts of the complete redevelopment of the area comprising residential units, commercial office space, retail and showroom accommodation and high tech industrial uses.

The report also developed a Transport Management Plan (TMP) for the development of Rhodes Peninsula to accord with government objectives for travel in the area. The TMP was granted approval, and timing and cost allocations for elements of the TMP were identified. Furthermore, it recommended the phased introduction of a range of infrastructure works to accommodate both traffic and public transport demands for the entire development of Rhodes Peninsula. A number of these measures have already been implemented and further measures will be provided as development continues.

Therefore, the basis of this report is to set the overall context for the proposed development of Precinct C taking into account the guidelines and requirements outlined in the DCP and the TMP.

1.3 Structure

The remainder of the report is set out as follows:

- Chapter 2 provides a summary of the TMP and DCP.
- Chapter 3 gives an overview of the existing road network, public transport provisions and cycling facilities.

SITE LOCATION

PRECINCT C, RHODES PENINSULA

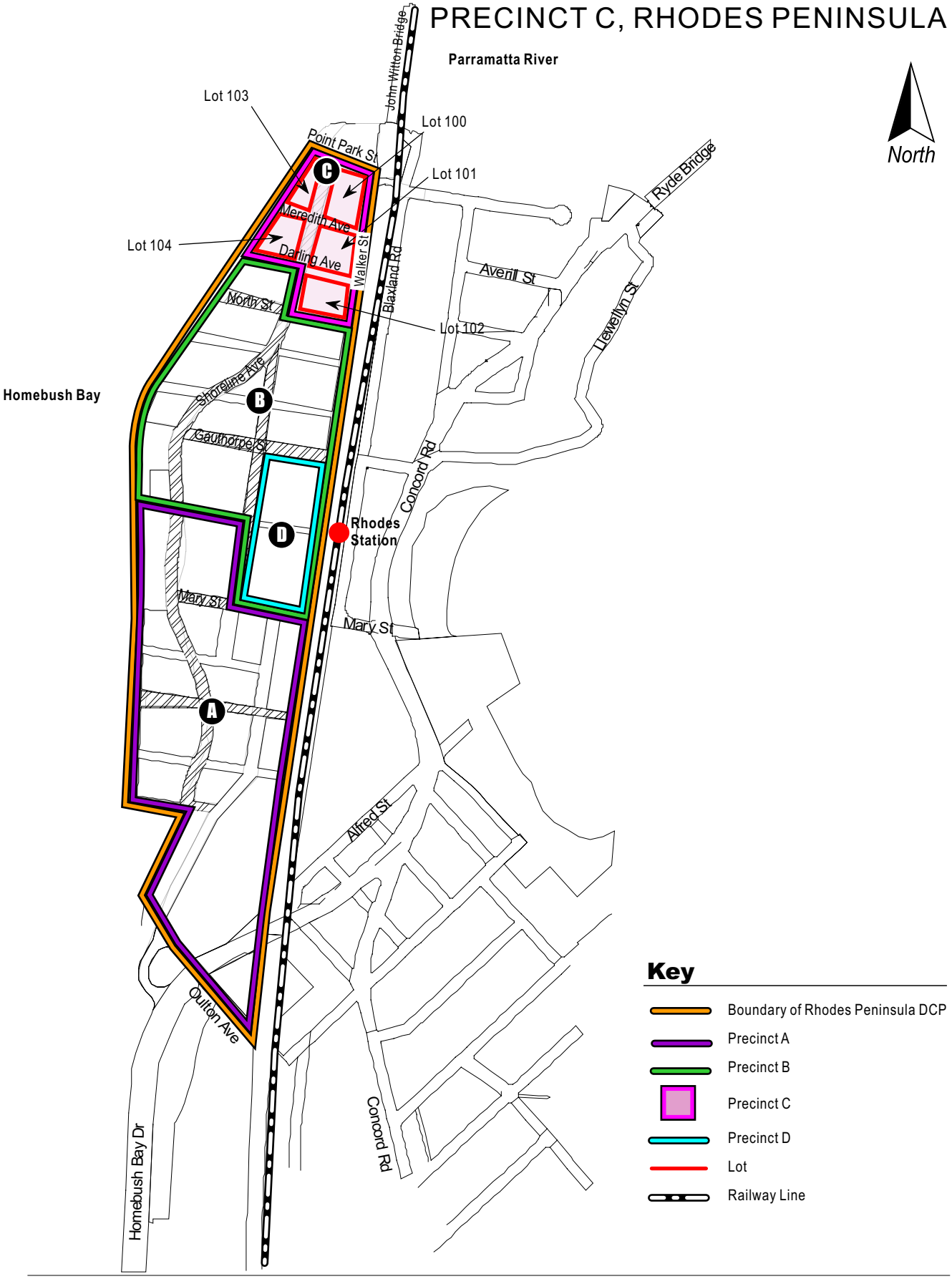

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Figure 1

Filename: 052825di01.ai

Date: 19 July 2005

- Chapter 4 describes the proposed Precinct C development.
- Chapter 5 assesses the external transport implications of the proposed development.
- Chapter 6 demonstrates the proposed development's general compliance with the TMP and DCP.
- Chapter 7 describes the local traffic conditions and intersection operations with the development in place.
- Chapter 8 provides a summary and conclusions.

2. Background Situation

2.1 Rhodes Peninsula Transport Management Plan

2.1.1 Overview

The TMP is a traffic and transport management strategy that was devised for Rhodes Peninsula. Its purpose is to enable the proper planning and sustainable development of the area and a means by which the Minister for Urban Affairs and Planning can ensure that new infrastructure provisions are provided in a co-ordinated manner, in accordance with the phased redevelopment of the site.

2.1.2 Recommendations

The report concluded with and made the following recommendations:

- Maximise densities near the railway station.
- The proposed intersection improvements, in the short term, can accommodate future traffic levels generated by the development and the adjacent Australand development.
- Northern and southern vehicular access points provide flexible entry and exit, reduce traffics volumes using the Concord Road/Homebush Bay Drive intersection and they minimise traffic penetrating existing residential areas.
- Restrict parking supply by specifying maximum parking numbers for different uses.
- Upgrade Rhodes Station to influence increased public transport use, by existing and future residents, and provide 8 carriage trains during peak hours.
- Enhance bus service provision, facilities and information.
- The most important features of meeting mode split targets are to encourage walking or cycling to work by providing local employment, and attractive/safe pedestrian/cycle routes close to public transport services.
- Provide convenient pedestrian/cycle routes within the area and link to adjacent areas, in particular across the railway line.
- Investigate the potential for a bus/pedestrian/cycle bridge link across Homebush Bay, a ferry wharf and private ferry service.
- Study and implement travel demand management.
- Review the TMP after 5 years.

2.1.3 Land uses around the site

Within the TMP study area three main land uses were identified for the overall site. Mixed use development is zoned along the southern and south eastern boundary of the TMP area - between Gauthorpe Street, Oulton Avenue, Marquet Street and Homebush Bay Drive. Open space is zoned along the northern and western boundary of the TMP area and residential in all other areas. Just beyond these areas to the east and north of the railway are established residential areas and to the east and south of the railway line is an office campus. These zonings are illustrated in **Figure 2**.

LAND USES AND STREET LAYOUT OF RHODES PENINSULA

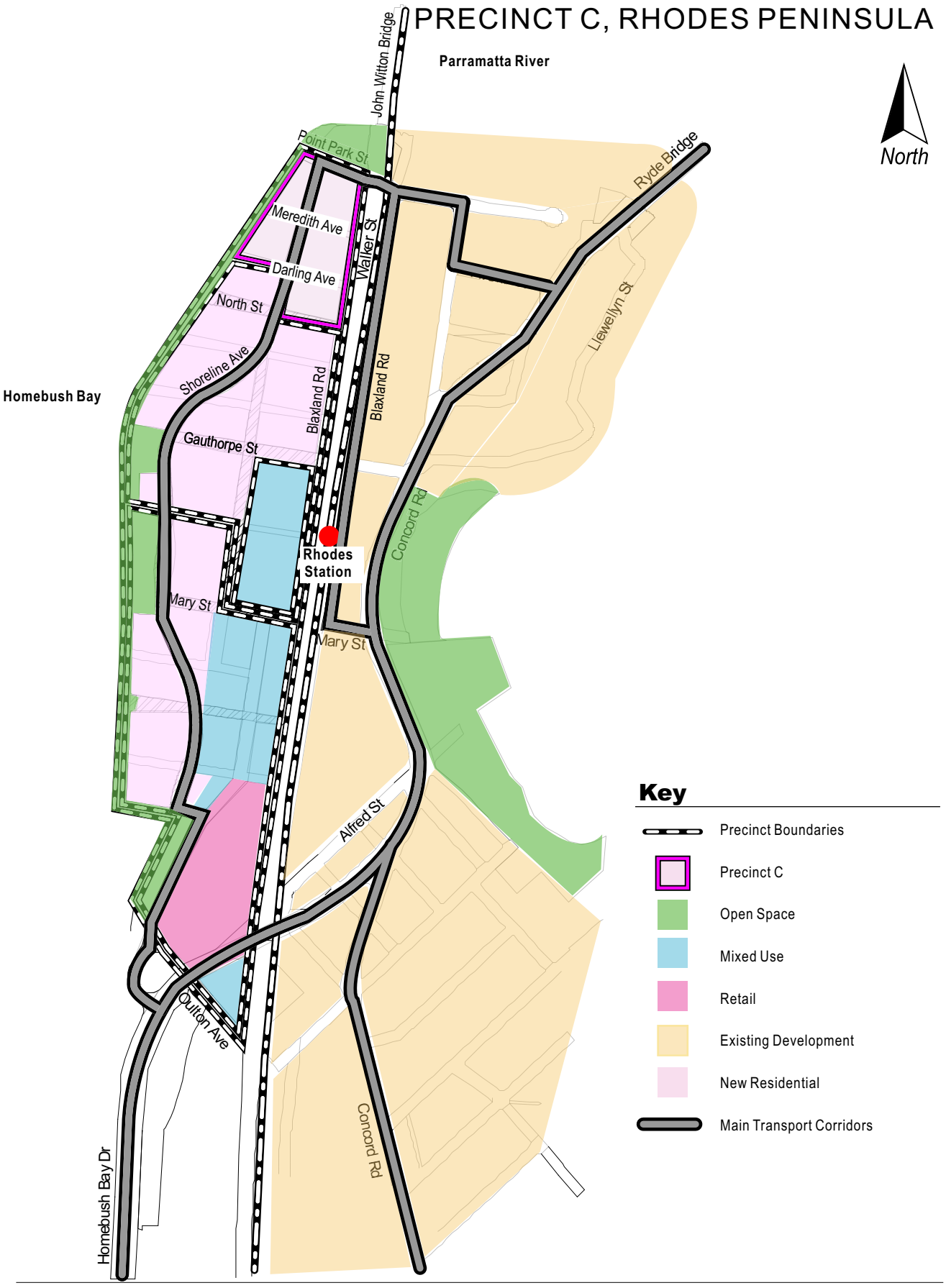

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Figure 2

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Date: 19 July 2005

2.1.4 Proposed Plans

In order to assess the impacts of the development of the entire site the TMP made the following assumptions regarding development quantum:

- 3,026 residential units
- 50,000sqm commercial office
- 25,000sqm nla retail
- 15,000sqm nla bulky goods
- 12,000sqm gfa high tech industrial

Based on these assumptions it was estimated that the site would generate approximately 3,920 trips per hour during the am peak, 1,510 of which would be vehicle trips, and 7,120 trips during the pm peak, 1,970 of which would be vehicle trips.

2.1.5 Landuse for Precinct C

Within Precinct C open space is provided for along Parramatta River and Homebush Bay and the remaining land is for residential use. A total of 700 residential units are proposed.

Applying the same trip generation rate assumed in the TMP (0.29 vehicle trips/unit) it is estimated that Precinct C will generate 560 person trips per hour during peak hours, 203 of which would be vehicle trips.

2.1.6 Infrastructure Funding

A Contributions Framework was developed for the Rhodes Peninsula that ensures all infrastructure works and programs are properly divided among the different landowners of the site and in order that all works are carried out.

2.2 Rhodes Peninsula Development Control Plan

2.2.1 Overview

The DCP provides a framework plan that sets the urban design structure for the Rhodes Peninsula, guidelines for controlling development and technical criteria for domain elements. Its aim is *"to create a high quality, integrated, attractive and safe urban environment for all future residents, workers and visitors"* (DCP, 2000).

2.2.2 Objectives

Specific objectives of the plan include providing a street layout that maximises connections to all surrounding areas and creates a high quality public domain that is permeable and safe, optimising the use of public transport and reducing travel demand. These can be achieved by:

- Establishing a continuous network for vehicles, pedestrians and cyclists throughout the site and minimising public dead end streets.
- Giving pedestrians and cyclists priority in residential areas using means such as pedestrian through block connections, footpaths, kerb ramps, street trees, minimising vehicles crossing footpaths, and designing carriageways for slow vehicle speeds to deter through traffic.
- Maximising access to Rhodes Station by creating a permeable layout of streets, pedestrian arcades and walkways and creating an appropriate setting in terms of pedestrian access facilities and modal change.
- Minimising on-street public and private parking provision to all developments.

- Accommodating a potential future bus route through the site in the design of streets.
- Promoting sustainable transport options.

Within the Framework Plan map the land use zonings with the primary and secondary (local) streets pattern are identified. This is shown in **Figure 2**.

The DCP then outlines a strategy for several elements of both the public and private domain.

2.2.3 Public Domain

In terms of the pedestrian network and amenity the DCP stresses the need for continuity, comfort, convenience, appearance, security, and accessibility of links.

The cycle strategy is aimed at designing for both the commuter and the recreational cyclist, entailing design of safe and convenient access and secure parking for bicycles.

The strategy for public transport is to take advantage of the site's location next to a railway station and its proximity to several bus stops and the ferry wharf, in addition to providing for future public transport provision.

The objectives of the vehicle circulation and parking strategy are to provide convenient access to and between components of the development with consideration for the road functional hierarchy, pedestrian activity patterns and safety. In addition, the provision of on-street parking is aimed at adding life to the street but reflecting the requirements of adjacent land uses fronting the streets. Specific character, control, parking, lighting, and cycleway requirements of each street or type of street are then given.

2.2.4 Private Domain

Provision of a pedestrian environment that is accessible for the ability and mobility impaired was deemed to be an important element in the design of the site.

Vehicular access to developments should minimise pedestrian and vehicle conflict, visual intrusion and disruption to the continuity of the streetscape. Access to parking should be afforded from the rear or side lanes or secondary streets where possible, driveways should be consolidated and access and pathway layouts should be designed to Australian Standards (AS2890.1, 1993). The maximum driveway width is 6m generally, except into the retail area (12m) and detached, pair or row housing (2.5m). Dependant on the number of vehicles, 3m is the preferred driveway width of driveway crossings, and car park and service entries.

Parking requirements have been minimised throughout the site to encourage public transport use, therefore the following provisions are required for residential use:

- Generally – minimum of 1 space per dwelling;
- Residential 1 bedroom – max 1 space per dwelling;
- Residential 2 bedroom – max 1.2 space per dwelling;
- Residential 3 bedroom – max 1.5 space per dwelling;
- Visitors – max 1 space per 10 units; and
- Service vehicles – 1 space per 50 units for first 200 units plus 1 space per 100 units thereafter.

Stack parking is permitted up to 2 cars where spaces are attached to the same strata title comprising a single dwelling unit, subject to the parking limit.

A minimum of 1% of the total parking spaces should be provided for people with disabilities, motorcycle parking is to be provided at a rate of 1 car parking space per 100 car parking spaces and bicycle parking is a minimum of 1 space per 3 units for residents and 1 space per 12 units for visitors. Bicycle parking must conform to the provisions in the Austroads "Guide to Traffic Engineering Practice Part 14: Bicycles", 1999.

2.2.5 Public Domain Technical Manual

The technical manual presents in greater detail some of the urban design requirements. This includes but is not limited to design of pedestrian crossings, and street and pavement layouts and treatments.

3. Existing Transport Conditions

3.1 Existing Road Network

The Rhodes Peninsula is bounded by two major north-south arterial roads – Concord Road and Homebush Bay Drive. Direct connections are provided from these routes to the major east-west roadways of the Western Motorway (M4), Parramatta Road, Hume Highway, Victoria Road and the Hills Motorway (M2). The Northern Railway Line that connects Hornsby and North Sydney also runs through the Peninsula. This highlights that Rhodes Peninsula is located in close proximity to major road and rail networks that linking it to various areas of Sydney. It is also located adjacent to major sporting facilities at Homebush Bay.

3.2 Existing Public Transport

3.2.1 Bus Services

Bus services to the proposed development are available from Concord Road. State Transit Authority operates the following services, whose routes are shown in **Figure 3**:

- Route 458 operates between Ryde and Burwood Railway Station. The service provides a 15 to 20 minute peak period frequency with half hour frequency during the daytime on weekdays and on Saturday. Two early morning weekday services are provided from Macquarie Centre to Burwood Railway Station.
- Route 459 operates between Macquarie University and Strathfield Railway Station. The service provides half hour frequencies during the daytime on weekdays and Saturdays; and,
- Route 461 operates between Ryde shops and City Town Hall. The service provides a half hourly weekday and Saturday evening frequency and half hourly Sunday daytime frequency reducing to hourly frequency on Sunday evenings.

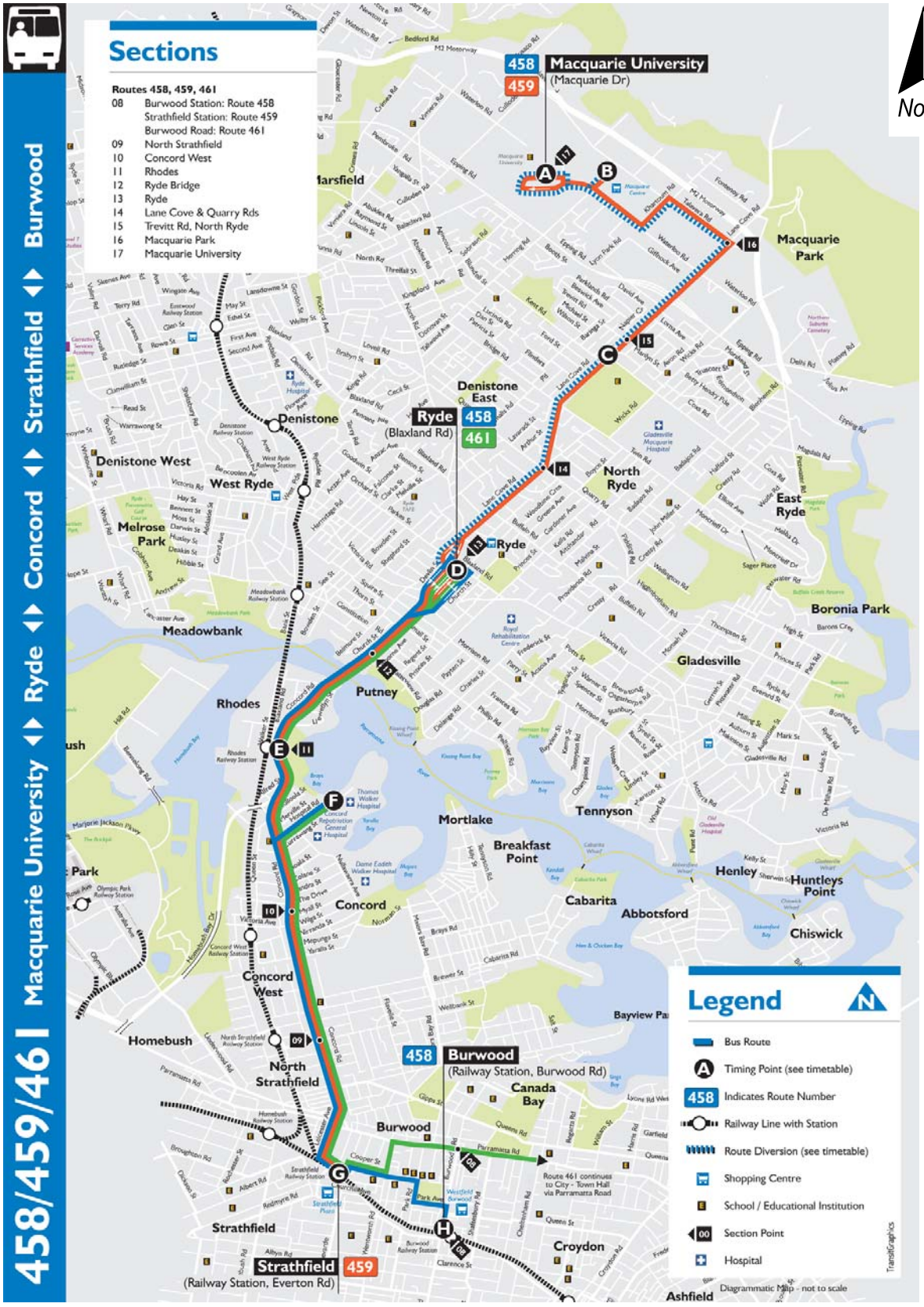
3.2.2 Rail Services

Rhodes Railway Station is located on the Northern Line, which connects major stations such as Epping, Hornsby and the central coast in the north, Strathfield in the south and Sydney CBD in the east. Strathfield Railway Station (2 stops to the south), an important interchange, also provides rail links to west and southwest Sydney as well as bus, taxi and Country Link services. Four stopping services are available from the station in either direction during weekday peak hours. During off peak periods a frequency of stopping services is 30 minutes which includes evenings and weekends.

Table 3.1 summarises the availability of train services at Rhodes Railway Station.

EXISTING BUS SERVICES

PRECINCT C, RHODES PENINSULA



Source: TransitGraphics (www.131500.com.au)

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Figure 3

Filename: 052825di14.ai

Date: 19 July 2005

Table 3-1 – Frequency of Rail Services at Rhodes Railway Station

Destination/Direction	6.00am to 9.00 am	9.00am to 4.00pm	4.00pm to 7.00pm	7.00pm to 10.00pm	Sat/Sun 8.00am to 4.00pm
Hornsby to North Sydney & City via Strathfield	12	21	12	6	16
North Sydney to Hornsby & Berowra via Epping	10	21	12	6	16

Source: www.cityrail.com.au (6th September 2005)

On weekdays the first service from Rhodes to Hornsby is at 5:48am whilst the last service is at 12:18am. In the reverse direction, services operating to the City/North Sydney commence and finish at 5:06am and 1.33am respectively. The average travel time between Rhodes and Central stations is 26 minutes and to Hornsby is 27 minutes.

3.2.3 Ferry Services

The Rivercat Ferry service provides public transport connections between Parramatta and the Sydney CBD. The closest Rivercat stops to the Rhodes Peninsula are at Abbotsford and Meadowbank.

There is also a wharf for public transport vessels at the tip of Homebush Peninsula.

3.3 Existing Cycling Facilities

Figure 4 identifies the existing cycle network in the vicinity of the site.

An on-carriageway regional cycle route is identified on Walker Street, forming part of the RTA cycle network. The route continues to the new roads adjacent to the Rhodes Shopping Centre and further south it connects to Oulton Avenue and then into Bicentennial Park. This is known as the Ryde Bay to Botany Route.

A recreational cycle route is provided along the Foreshore connecting Bicentennial Park in the south to the northern end of the Foreshore Park.

3.4 Future Influences

In regional terms the main transport changes which will be likely to influence Rhodes are:-

- The Epping – Chatswood Rail Link – enhancing public transport accessibility from Rhodes to North Ryde and the Lower North Shore;
- Possible quadrupling of the rail lines from Epping to Strathfield enhancing local train service frequency; and,
- Continued growth in arterial traffic flows (which could be influenced to some extent when the Sydney Western Orbital route is constructed).

The Homebush Bay area has an intermittent influence of both traffic generation and enhanced public transport services associated with major events/shows in this area.

EXISTING CYCLE NETWORK

PRECINCT C, RHODES PENINSULA

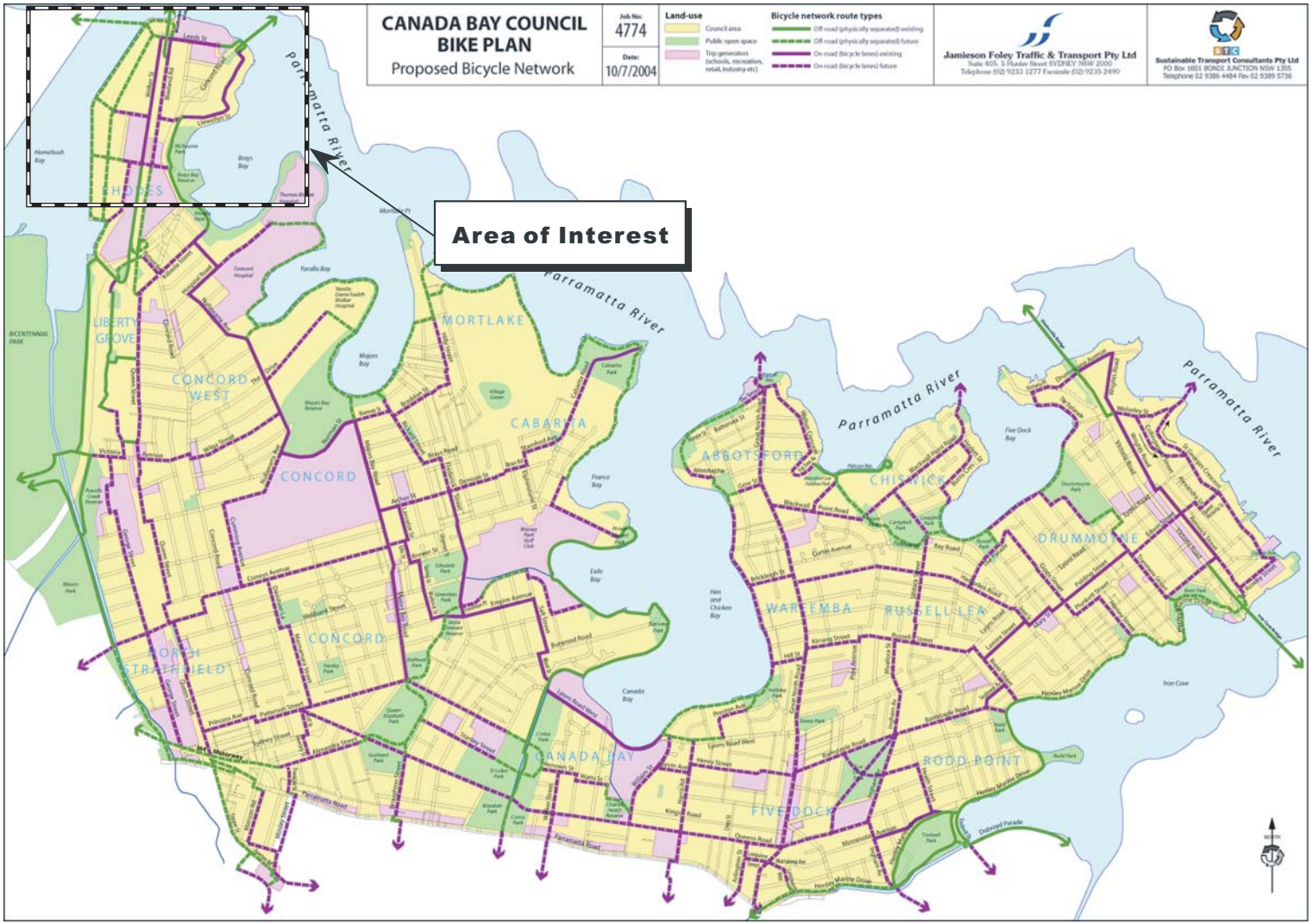

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Figure 4

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Date: 19 July 2005

4. Proposed Precinct C Master Plan

4.1 Description of Proposed Development

The Precinct C Masterplan provides for 70,850 sqm gross floor area (gfa) equating to approximately 700 apartments. The precise quantum of development on each lot is not available at this stage, however for the purposes of this report it has been assumed that the number of units on each lot is proportionate to the gross floor area for each lot. This is shown in **Table 4-1**.

Table 4-1 – Assumed Development Quantum

Lot #	GFA (sqm)	% of total GFA	# Apts[1]
100	17,900	24%	170
101	20,450	29%	200
102	17,500	24%	170
103	6,100	10%	70
104	8,900	13%	90
Total	**70,850**	**100%**	**700**

4.2 Proposed Street Layout

The street network is laid out in a grid pattern. Walker Street runs north-south along the eastern boundary of the site, parallel and west of which runs Shoreline Avenue. From North to South, Point Park Street, Meredith Avenue, Darling Avenue and North Street meet both Walker Street and Shoreline Avenue at 90 degrees. These minor roads terminate in the west at Foreshore Park.

The layout of the street pattern is consistent with that illustrated in the DCP.

Parallel on-street parking is provided on both sides of all streets except on Darling and Meredith avenues and 90 degree angled parking is provided on the northside of Point Park Street.

The street layout of Precinct C was determined by a previous DA (DA 333-10-2002) which was granted consent on 30 March 2004 for the subdivision of the site into 5 allotments and the creation of public streets and open space.

[1] Rounded to the nearest 10.

5. External Transport Implications

5.1 TMP

Given the anticipated traffic volumes predicted to be generated by the entire development, the following infrastructure works were identified in the TMP to accommodate these volumes. They are also illustrated in **Figure 5**.

Upgrade and signalisation of the following intersections:

- Oulton Avenue/Homebush Bay Drive;
- Concord Road/Homebush Bay Drive;
- Concord Road/Averill Street; and
- Concord Road/Mary Street.

In addition to:

- Intersection and footpath improvements along Leeds Street, between Cavill Avenue and Averill Street;
- Traffic calming on Blaxland Street;
- Roadworks and street lighting on the existing bridge connecting Walker and Blaxland streets;
- Roadworks, tunnel and lighting beneath Homebush Bay Drive where the Walker Street extension meets Oulton Avenue;
- Rail station facilities upgrade;
- New bus services;
- Bus/taxi facilities;
- Foreshore cycleway; and
- New pedestrian/cycle bridges/stairs/underpasses.

The TMP indicates that the majority of these works will be completed by Phase 3 which also includes progressive occupation of residential buildings in Precinct C.

5.2 Funding

Under the Contributions Framework significant contributions will be made by the developer towards the provision of infrastructural works and programs, as listed above.

MAIN TRANSPORT INFRASTRUCTURE WORKS

PRECINCT C, RHODES PENINSULA

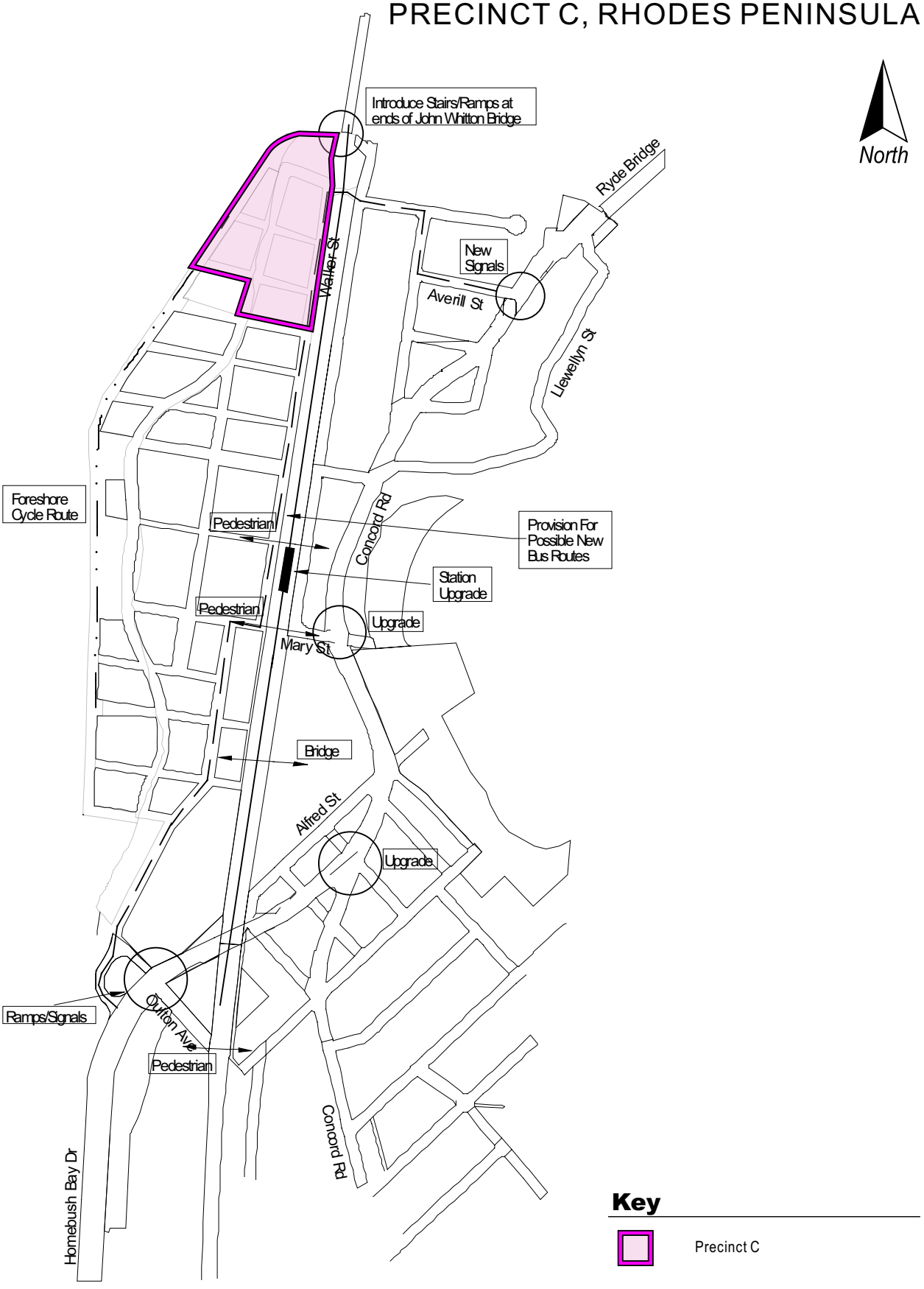

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Figure 5

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6. Adherence to DCP

6.1 Parking

Car and bicycle parking will be provided in accordance with the DCP, as outlined in Chapter 2. Details of parking will be provided in the development application plans for each individual lot, when they are submitted.

6.2 Driveways

The locations of driveways are indicative, and may change at the detailed design stage. However, they are generally in accordance with the DCP in that they are provided on secondary roads and are consolidated.

6.3 Pedestrian Access

Pedestrian access into the apartment buildings on Lots 100 to 104 is provided on at least 2 sides of the lot and increase as the dwelling units and number of blocks increase. Pedestrian access is distributed as follows:

- Lot 100 – 3 access points, on Walker Street, Shoreline Avenue and Point Park Street;
- Lot 101 – 4 access points, on Walker Street, Darling Avenue and 2 on Meredith Avenue;
- Lot 102 – 5 access points, on North Street, Shoreline Avenue, Darling Avenue and 2 on Walker Street;
- Lot 103 – 2 access points, both on Shoreline Avenue; and
- Lot 104 – 2 access points, on Shoreline Avenue and Darling Avenue.

Pedestrian thoroughfares through each lot increases permeability of the lots, thus helps to minimise walking distances and improves safety, thus meeting the objectives of the DCP.

6.4 Internal Traffic Arrangements

The internal traffic arrangements will generally be provided in accordance with the DCP.

Loading will be provided on site.

These details will be provided in the development application for each building.

7. Local Traffic Conditions

7.1 Traffic Volumes on Local Streets

As stated previously it is estimated that approximately 203 vehicle trips will be generated by the Precinct C development, based on a vehicle trip rate of 0.29 vehicles per unit per peak hour.

A previous traffic assessment conducted by MWT in 2000, in preparation of the TMP assumed a residential split of 20% inbound and 80% outbound trips in the morning peak, and the reverse in the evening. It was also assumed that 50% of the trips would be heading to or coming from the north (ie north of Concord Road); 15% to/from the south-east (ie south of Concord Road) and 35% to/from the south-west (ie south of Homebush Bay Drive). These assumptions were used to determine the trip distribution for the trips generated by Precinct C. The resulting trip generation for the site during the morning and evening peak periods are shown in **Figure 6** respectively.

Trips external to Precinct C but passing through it were also derived from the 2000 assessment. These volumes are shown in **Figure 7**.

The combined trips of the Precinct C development and the background traffic are presented in **Figure 8**.

During the both the morning and evening peak Walker Street is forecasted to carry the highest traffic volumes; 698 vehicles (morning) and 833 vehicles (evening) at its busiest point, south of Point Park Street. It is followed by Shoreline Avenue, which carries 330 vehicles at its busiest point, south of Point Park Street during both peak periods.

The minor or local roads only carry the traffic generated by the individual lot upon which street it is located. Darling Avenue is the busiest of the local roads because vehicle access into Lots 101 and 102 are afforded from it.

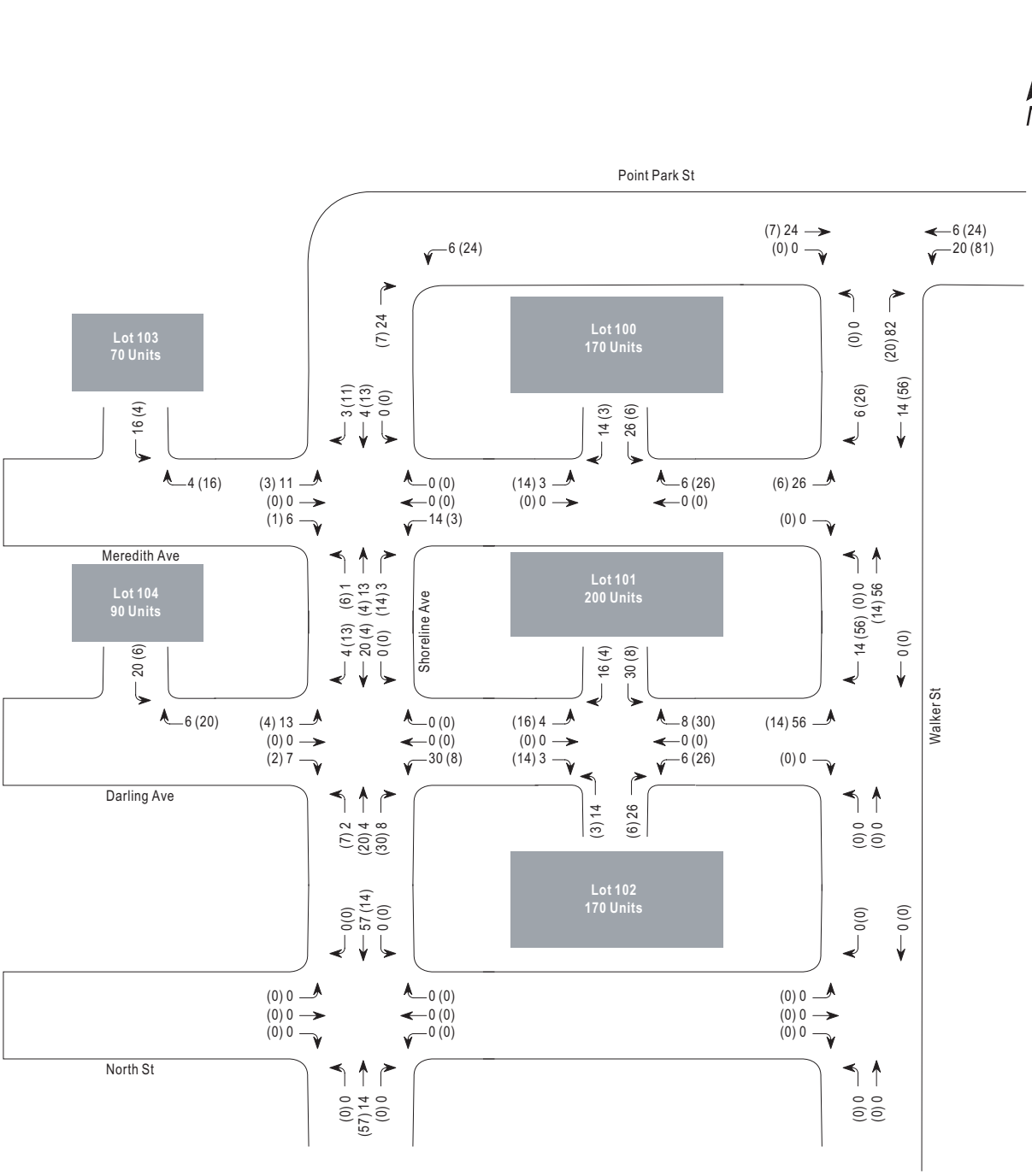
7.2 Intersection Control and Operations

Intersections may need to be controlled to provide adequate capacity to non-priority movements or as a traffic calming method. Austroads "Guide to Intersections at-Grade" (2005) provides screening criteria to determine circumstances where traffic signal or roundabout controls may be needed, rather than priority. The thresholds below which Austroads specifies that adequate capacity will apply without the need for separate analysis are shown in **Table 7-1**.

The highest two-way traffic flows recorded on the through road approach and the cross road approach at each intersection in Precinct C is shown in **Table 7-2**.

PRECINCT C GENERATED TRAFFIC VOLUMES (2005 MODEL)

PRECINCT C, RHODES PENINSULA



Key

5: AM Peak

(5): PM Peak

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Figure 6

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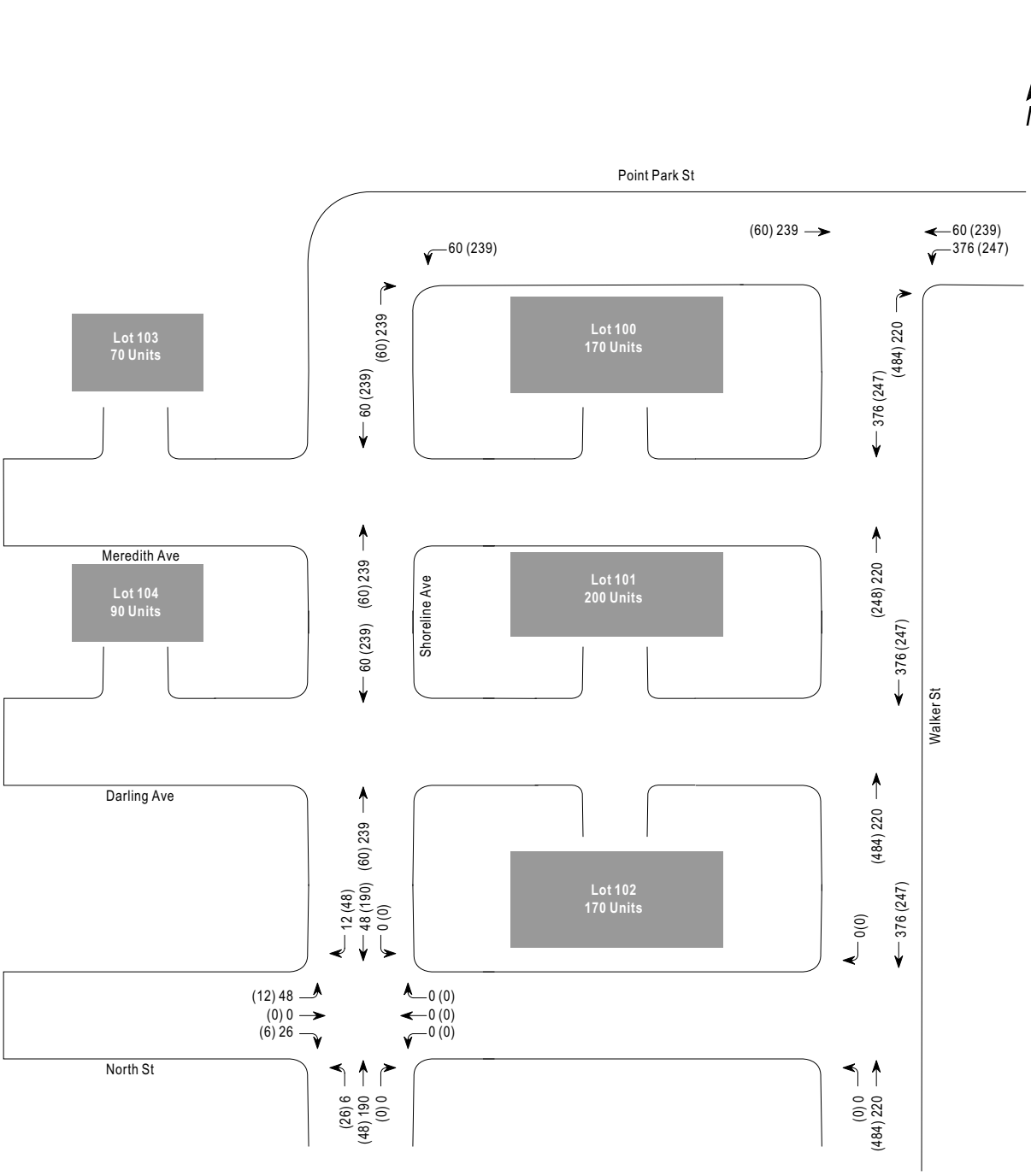
BACKGROUND TRAFFIC VOLUMES (2000 MODEL)

PRECINCT C, RHODES PENINSULA



Key

5: AM Peak

(5): PM Peak

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Figure 7

Filename: 052825di05.ai

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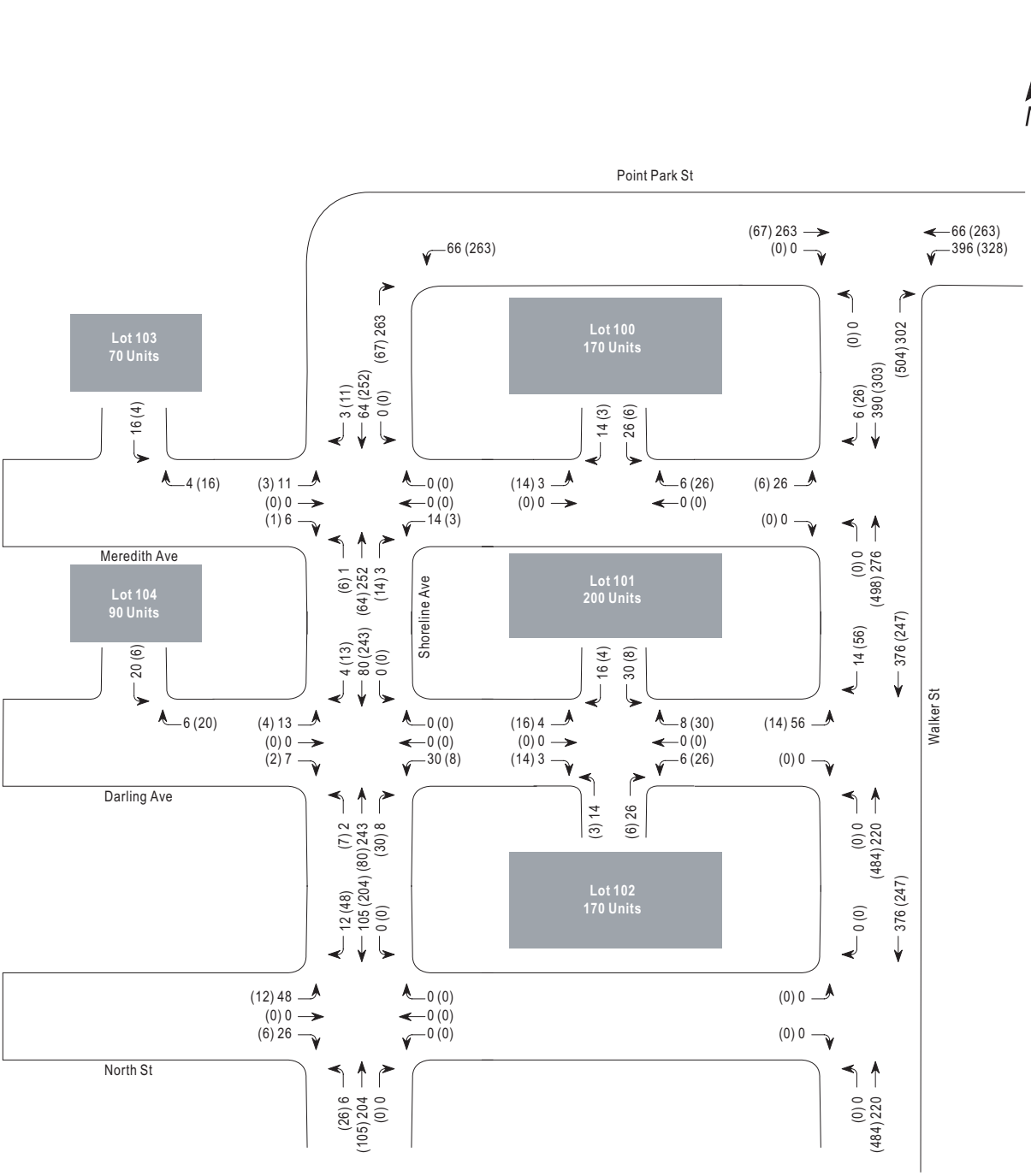
TOTAL TRAFFIC VOLUMES (2005 MODEL)

PRECINCT C, RHODES PENINSULA



Key

5: AM Peak

(5): PM Peak

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Figure 8

Filename: 052825di06.ai

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Table 7-1 – Traffic Volume Thresholds for Controlling Intersections

Road Type	Maximum Design Hour Volumes Combinations (two-way traffic)		
Two lane-through roadway	400	500	650
Cross Road	250	200	100
Four lane through-roadway	1,000	1,500	2,000
Cross Road	100	50	25

Table 7-2 – Two-way Traffic Flows at each Intersection

Intersection	Through Road Lanes	AM Peak Through Rd Volume	AM Peak Cross Road Volume	PM Peak Through Rd Volume	PM Peak Cross Road Volume	Further analysis Required?
Walker St./ Point Park St.	4	1,026	329	1,162	330	Yes
Walker St./ Meredith Ave.	4	698	32	832	32	No
Walker St./ Darling Ave.	4	666	70	801	70	No
Walker St./ North St.	4	596	0	731	0	No
Shoreline Ave./ Point Park St.	2	329	0	330	0	No
Shoreline Ave./ Meredith St.	2	339	20	341	20	No
Shoreline Ave./ Darling Ave.	2	370	37	469	38	No
Shoreline Ave./ North St.	2	370	92	469	92	No

As **Table 7-2** shows there are low volumes of turning movements at all intersections within Precinct C, except at Walker Street and Point Park Street. Therefore this intersection warrants further analysis.

The intersection of Walker Street and Point Park Street has been analysed using the aaSIDRA Version 2.1 intersection analysis program. SIDRA determines the average delay encountered by vehicles, the degree of saturation of the intersection and the level of service. The degree of saturation is the ratio of the arrival rate of vehicles, to the capacity of the approach. SIDRA provides analysis of the operation conditions which can be compared to the performance criteria set out in **Table 7-3**.

The analysis assumed an Unsignalised Stop Sign controlled intersection, with priority given to Walker Street and Point Park Street westbound approach, and Stop control is given to the Point Park Street eastbound approach. The Masterplan preliminary design of this intersection indicates that the intersection will be a 'Y' intersection with priority given to Walker Street. Other assumptions include a 10metre median on the priority approaches, one lane on each approach with an additional right turning lane on the westbound approach.

Table 7-3 - Level of Service Criteria

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals/ Roundabout	Give Way/STOP Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity; accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity; requires other control mode
F	>70	Extra capacity required	Extreme delay; traffic signals or other major treatment required.

Adapted from RTA Guide to Traffic Generating Developments, 1993.

The analysis results indicate that the worst movement LOS would be B and the largest average movement delay would be experienced by Point Park Street (16.4 seconds in the am peak and 19.6 in the pm peak)[2]. The corresponding queue lengths were 4 vehicles and 1 vehicle respectively. Therefore the intersection should operate with minimal delay under priority controls.

All remaining intersections should operate well with relatively minor delays to traffic entering or exiting the local streets.

[2] SIDRA calculates a LOS and average delay on the worst movement at unsignalised intersections.

8. Summary and Conclusions

This report has presented the objectives and recommendations of the TMP and DCP for the Rhodes Peninsula. The residential developments proposed for Precinct C are generally in accordance with both the TMP and the DCP.

It is estimated that development of 700 apartments in Precinct C will generate approximately 203 vehicle trips during the morning and evening peaks. Combining the Precinct C site development traffic with the background traffic (ie traffic generated on other lots within the complete development) all intersections in Precinct C should operate effectively with minimal delay to minor entering or exiting traffic. The transport arrangements are however flexible.